I CLAIM

Sub (3) 1.   A signal processor comprising

- a data compression encoder which operates to compression encode source data into compression encoded data having a variable compressed data rate,

5   - a multiplexer coupled to said data compression encoder and arranged in operation to concatenate said compressed data and ancillary data into a concatenated data stream, and

- a control processor coupled to said multiplexer and arranged in operation to control said multiplexer whereby a combined data rate of said concatenated data

10   stream is less than or equal to a pre-determined maximum.

2.   A signal processor as claimed in Claim 1, wherein said data compression encoder is arranged in operation to generate said compression encoded data in accordance with a compression encoding algorithm, the compressed data rate being

15   varied by said compression encoding algorithm in dependence upon the content of said source data.

3.   A signal processor as claimed in Claim 1, wherein said compressed data rate is varied by said compression encoding algorithm in dependence upon an estimated

20   comparison of said source data and a version of said source data produced by de-compressing said compression encoded data.

4.   A signal processor as claimed in Claim 2, wherein said control processor is coupled to said compression encoder and arranged in operation to influence said

25   compression encoding algorithm to an effect of controlling said compressed data rate produced by said compression encoder whereby a pre-determined data rate is provided within said concatenated data stream for said ancillary data.

5. A signal processor as claimed in Claim 4, wherein said control processor is arranged in operation to maintain the compressed data rate at a pre-determined minimum, said pre-determined data rate provided for said ancillary data being determined in accordance with a difference between said pre-determined minimum

5 data rate and said pre-determined maximum data rate.

6. A signal processor according to claim 1, wherein said control processor is arranged in operation

- to determine a target data rate for said compression encoded data rate in
10 dependence upon an amount of said ancillary data to be concatenated into said concatenated data stream, and

- to control said compression encoder to maintain said target bit rate.

7. A processor according to claim 2, wherein the target bit rate is a rate Tb which
15 is pre-set at a predetermined percentage of the maximum bit rate and the amount of ancillary data to be added.

8. A signal processor as claimed in Claim 1, wherein said compression algorithm is arranged in operation
20 - to generate an encoded representation of said source data, and

- to quantise said encoded data to produce said compression encoded data, wherein said influence of said compression encoding algorithm is effected by controlling said quantisation of said encoded data representative of said source data in order to control said compressed data rate.

25
Swb132

9. A signal processor as claimed in Claim 8, wherein said encoded representation of said source data is formed using a discrete cosine transform or the like.

10. A signal processor as claimed in Claim 9, wherein said compression encoding
30 algorithm is an MPEG type algorithm such as MPEG2 or the like.

11.   A signal processor as claimed in Claim 1, wherein said compression encoder produces said compression encoded data as encoded data frames.

5   12.   A signal processor as claimed in Claim 11, wherein said control processor is arranged in operation to determine said target bit rate as an average target data rate TBR_{ave}, in accordance with the following expression

$TBR_{ave} = M-D/m$, where the maximum bit rate is M, the amount of ancillary data is D, and m is the number of frames over which the ancillary data is to be

10 concatenated to the encoded signal.

13.   A signal processor as claimed in Claim 12, wherein the number of frames over which the ancillary data is to be concatenated m is reduced by 1 upon the encoding of each frame and the amount of ancillary data D is reduced by Fn upon the encoding of

15 each frame where Fn is the amount of data symbols in the encoded frame.

14.   A signal processor as claimed in Claim 1, wherein the source data is representative of audio signals or video signals, or audio and video signals.

20 15.   A signal processor as claimed in Claim 14, wherein the ancillary data is descriptive metadata associated with the source data.

16.   A data recording apparatus comprising

- a signal processor as claimed in Claim 1 arranged in operation to produce a

25 concatenated data stream of compression encoded data and ancillary data, and

- a recording drive arranged in operation to record the concatenated data stream produced by the signal processor onto a recording medium, the predetermined maximum data rate of the combined data rate of the concatenated data stream being determined in accordance with the bandwidth of the recording medium.

17. A data recording apparatus as claimed in Claim 16. wherein said concatenated data is arranged to be recorded in helical scan tracks on said recording medium.

5   18. A data recording apparatus as claimed in Claim 17, wherein the encoded data produced by the signal processor as part of the concatenated data stream is divided into frames and said recording drive operates to record one of said frames per track, ancillary data being recorded in the remainder of said track.

10   19. A communications apparatus which operates to communicate source data, comprising,

- a signal processor as claimed in Claim 1, which is arranged in operation to produce a concatenated data stream, which includes the source data represented as compression encoded data with ancillary data, and

15   - a transmission channel having a predetermined bandwidth, wherein the predetermined maximum data rate of the concatenated data stream is determined in dependence upon the predetermined bandwidth.

20. A method of processing source data comprising the steps of

20   - compression encoding the source data into compression encoded data having a variable compressed data rate,

- concatenating said compressed data and ancillary data into a concatenated data stream, wherein a combined data rate of said concatenated data stream is less than or equal to a pre-determined maximum.

25

21. A method as claimed in Claim 20, wherein the step of compression encoding the source data is performed in accordance with a compression encoding algorithm, the compressed data rate being varied by said compression encoding algorithm in dependence upon the content of said source data.

30

22.   A method as claimed in Claims 20, wherein said compressed data rate is varied by said compression encoding algorithm in dependence upon an estimated comparison of said source data and a version of said source data produced by de-compressing said compression encoded data.

5

23.   A method as claimed in any of Claims 20, wherein the step of compression encoding the source data comprises the step of

- influencing said compression encoding algorithm to an effect of controlling said compressed data rate whereby a pre-determined data rate is provided within said

10   concatenated data stream for said ancillary data.

24.   A method as claimed in Claim 23, wherein the step of compression encoding the source data comprises the steps of

- maintaining the compressed data rate at a pre-determined minimum, said

15   method comprising the steps of

- determining a data rate for said ancillary data from a difference between said pre-determined minimum data rate and said pre-determined maximum data rate, and the step of concatenating said compression encoded data and said ancillary data comprises the step of

20   - concatenating said ancillary data at said determined rate.

25.   A method as claimed in Claim 23, wherein the step of compression encoding the source data comprises the steps of

- determining a target data rate for said compression encoded data rate in

25   dependence upon an amount of said ancillary data to be concatenated into said concatenated data stream, and

- controlling said compression encoder to maintain said target bit rate.

26.   A method as claimed in Claim 25, wherein the target data rate is a rate Tb which is pre set at a predetermined percentage of the maximum data rate and the amount of ancillary data added to each frame is dependent on M-Tb.

5   27.   A method as claimed in any of Claims 20, wherein the step of compression encoding said source data comprises the steps of

- generating an encoded representation of said source data, and

- quantising said encoded data to produce said compression encoded data, wherein the step of influencing said compression encoding algorithm comprises the

10 step of

- controlling said quantisation of said encoded data representative of said source data in order to control said compressed data rate.

28.   A method as claimed in Claim 27, wherein the step of generating an encoded

15 representation of said source data is formed using a discrete cosine transform or the like.

29.   A method as claimed in Claim 28, wherein said compression encoding algorithm is an MPEG type algorithm such as MPEG2 or the like.

20

30.   A method as claimed in any of Claims 20, wherein the step of compression encoding said source data comprises the step of

- producing compression encoded data frames.

25 31.   A method as claimed in Claim 30, wherein the step of determining said target data rate comprises the step of

- determining said target data rate as an average target bit rate TBR_{ave}, in accordance with the following expression

$TBR_{ave} = M-D/m$, where the maximum data rate is M, the amount of ancillary data is D, and m is the number of frames over which the ancillary data is to be concatenated to the encoded signal.

5 32. A method as claimed in Claim 31, wherein the step of determining the target data rate comprises the step of

- reducing by 1 a number of frames m over which the ancillary date is to be concatenated is reduced by 1 upon the encoding of each frame, and

- reducing the amount of ancillary data D by Fn upon the encoding of each

10 frame where Fn is the number of data symbols in the encoded frame.

33. A method as claimed in Claim 20, wherein the source data is representative audio signals or video signals, or audio and video signals.

15 34. A method as claimed in Claim 33, wherein the ancillary data is descriptive metadata associated with the source data.

35. A method of recording data comprising

- producing a concatenated data stream according to the data processing

20 method claimed in Claim 20, and

- recording the concatenated data stream onto a recording medium, the predetermined maximum data rate of the combined data rate of the concatenated data stream being determined in accordance with the bandwidth of the recording medium.

25 36. A method of recording data as claimed in Claim 35, wherein the step of recording comprises the step of

- recording said concatenated data stream in helical scan tracks on said recording medium.

37.   A method of recording data as claimed in Claim 36, wherein the step of producing said concatenated data stream comprises

- dividing said concatenated data stream into frames, and the step of recording comprises the steps of

5   - recording one of said frames per track, and

- recording ancillary data in the remainder of said track.

38.   A method of communicating source data comprising the steps of

- producing a concatenated data stream according to the data processing 10 method claimed in Claims 20, which includes the source data represented as compression encoded data with ancillary data, and

- communicating the concatenated stream via a transmission channel having a predetermined bandwidth, wherein the predetermined maximum data rate of the concatenated data stream is determined in dependence upon the predetermined 15 bandwidth.

39.   A computer program providing computer executable instructions, which when loaded onto a computer configures the computer to operate the data processor as claimed in claim 1.

20

40.   A computer program providing computer executable instructions, which when loaded on to a computer causes the computer to perform the method according to claim 20.

25 41.   A computer program product comprising a computer readable medium having recorded thereon information signals representative of the computer program claimed in claims 39 or 40.

ADD